



AF *Ren*

**TRANSMITTAL LETTER  
(General - Patent Pending)**

Docket No.  
**END920000065US1**

In Re Application Of: **Papathomas, Konstantinos**

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/778,996	2/7/01	Keehan, Christopher M.	30449	1712	

Title: **ENCAPSULANT COMPOSITION AND ELECTRONIC PACKAGE UTILIZING SAME**

COMMISSIONER FOR PATENTS:

Transmitted herewith is:

**Supplemental Appeal Brief (39 pages in triplicate)**

in the above identified application.

- ☒ No additional fee is required.
- ☐ A check in the amount of \_\_\_\_\_ is attached.
- ☒ The Director is hereby authorized to charge and credit Deposit Account No. **09-0457(IBM)** as described below.
- ☐ Charge the amount of \_\_\_\_\_
- ☒ Credit any overpayment.
- ☒ Charge any additional fee required.
- ☐ Payment by credit card. Form PTO-2038 is attached.

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

*Jack P. Friedman*  
Signature

Dated: **10/7/2004**

Jack P. Friedman  
Reg. No. 44,688  
Schmeiser, Olsen & Watts  
3 Lear Jet Lane, Suite 201  
Latham, NY 12110  
(518) 220-1850

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to the "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)] on

10/7/2004

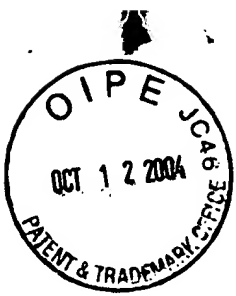
(Date)

*Kim Dwileski*  
Signature of Person Mailing Correspondence

**Kim Dwileski**

Typed or Printed Name of Person Mailing Correspondence

cc:



Docket No.: END920000065US1

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicants: Papathomas, Konstantinos

Examiner: Keehan, Christopher M.

Serial No.: 09/778,996

Art Unit: 1712

Filing Date: 2/7/01

Title: **ENCAPSULANT COMPOSITION AND ELECTRONIC PACKAGE UTILIZING SAME**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**SUPPLEMENTAL APPEAL BRIEF OF APPELLANT**

This Appeal Brief, pursuant to the Office Action mailed July 13, 2004, is an appeal from the rejection of the Examiner dated December 16, 2003. The prior Appeal Brief filed May 6, 2004 is incorporated, in its entirety, herein by reference. The present Supplemental Appeal Brief addresses the rejection of claims in the Office Action mailed July 13, 2004.

**REAL PARTY IN INTEREST**

International Business Machines, Inc. is the real party in interest.

**RELATED APPEALS AND INTERFERENCES**

None.

**STATUS OF CLAIMS**

Claims 1, 5, 6, 8, 14, 18-29, 31, 37, 39, 41, 43, 44, and 46-50 are currently pending. Claims 1, 5, 6, 8, 14, 18-29, 31, 37, 39, 41, 43, 44, and 46-50 have been rejected. This Brief is in support of an appeal from the rejection of claims 1, 5, 6, 8, 14, 18-29, 31, 37, 39, 41, 43, 44, and 46-50.

### **STATUS OF AMENDMENTS**

There are no After-Final Amendments which have not been entered.

### **SUMMARY OF INVENTION**

The present invention discloses an encapsulant composition comprising a resin material selected from the group consisting of epoxy and cyanate ester resins. See specification, page 7, lines 1-2. The composition further comprises a flexibilizing agent comprising 2 percent to about 5 percent by weight of said composition. See specification, page 15 - page 16, line 2. The composition further comprises a filler material comprising substantially spherical or spheroidal particles, each particle having a diameter of less than about 41 microns. Each particle may have a diameter exceeding 31 microns. See specification, page 21, lines 10-12.

A portion of each of said spherical or spheroidal particles may include a layer of coupling agent positioned thereon.. See specification, page 21, lines 16-18.

The epoxy resin may comprise glycidyl ethers. See specification, page 11, lines 22-24.

The cyanate ester resin may comprises at least a di-cyanate ester resin. See specification, page 15, lines 19-24.

The flexibilizing agent may be selected from the group consisting of polysulfones,

polyetherimide, polyamideimides, polyarylene ethers, polyesters, polyarylates, polycarbonates, polyurethanes, hydroxy-terminated polysulfone oligomers, 1,4-butane-diol diglycidyl ethers, neopentylglycol diglycidyl ether, cyclohexane dimethanol diglycidyl ether, trimethylol ethane triglycidyl ethers, dibromoneopentylglycol glycidyl ethers, propoxylated glycerol polyglycidyl ether, polypropylene glycol glycidyl ether, polyglycidyl ether of castor oil, dimer acid diglycidyl esters, resorcinol diglycidyl ether, epoxidized propylene glycol dioleates, epoxy esters, 1,2-tetradecane oxides, internally epoxidized 1,3-butadiene homopolymers, diglycidyl ether, glycidyl glycidate, bis(2,3-epoxy-2-methylpropyl)ether, polyglycoldiepoxides, E-caprolactone triol, copolymers of butadiene and styrene, butyl rubber, neoprene, polysiloxanes, carboxyl terminated poly n-butylacrylates, maleic anhydride terminated rubbers, epoxy functionalized rubbers, fluoridized rubbers, and hydroxylated or carboxylated EPDM rubbers. See specification, page 16, line 28 - page 19, line 7.

The present invention discloses an electronic package comprising: a substrate having an upper surface; a semiconductor chip mounted on a portion of said upper surface of said substrate and electrically coupled to said substrate, said semiconductor chip having a bottom surface and at least one edge surface being substantially perpendicular to said bottom surface. A material is positioned on at least said portion of said upper surface of said substrate and against at least a portion of said at least one edge surface of said semiconductor chip. The material is an encapsulant composition which includes a resin material, a flexibilizing agent and a filler material. See specification, page 4, lines 21-26; specification, page 6, lines 2-6; FIG. 1. The flexibilizing agent may comprise 2 percent to about 5 percent by weight of said composition.

See specification, page 15 - page 16, line 2. The filler material may comprise substantially spherical or spheroidal particles, each particle having a diameter of less than about 41 microns. Each particle may have a diameter exceeding 31 microns. See specification, page 21, lines 10-12.

A portion of each of said spherical or spheroidal particles may include a layer of coupling agent positioned thereon.. See specification, page 21, lines 16-18.

The electronic substrate may comprise an organic material. The organic material may include a resin selected from the group consisting of epoxies, polyimides, cyanates, fluoropolymers, benzocyclobutenes, polyphenylenesulfides, polysulfones, polyetherimides, polyetherketones, polyphenylquinoxalines, polybenzoxalines, polybenzoxazoles, polyphenylbenzobisthiazoles, dicyclopentadienes, and halide free resin. See specification, page 24, lines 1-10.

The substrate may include a reinforcing material. The reinforcing material may be selected from the group consisting of organic woven fibers, organic non-woven fibers, inorganic woven fibers, and inorganic non-woven fibers. See specification, page 24, lines 10-13.

The substrate may comprise a ceramic material. The substrate may includes a layer of glass material therein. See specification, page 25, lines 10-14.

The resin material may be selected from the group consisting of epoxy and cyanate ester resins. The epoxy resin may comprise cycloaliphatic epoxides. The cycloaliphatic epoxides may be derived from unsaturated aromatic hydrocarbon compounds. See specification, page 7, lines 1 - page 8, line 13.

The epoxy resin may comprise glycidyl ethers. See specification, page 11, lines 22-24

The resin material may be a cyanate ester resin and comprises at least a di-cyanate ester resin. See specification, page 15, lines 19-24.

The flexibilizing agent may be selected from the group consisting of polysulfones, polyetherimide, polyamideimides, polyarylene ethers, polyesters, polyarylates, polycarbonates, polyurethanes, hydroxy-terminated polysulfone oligomers, 1,4-butane-diol diglycidyl ethers, neopentylglycol diglycidyl ether, cyclohexane dimethanol diglycidyl ether, trimethylol ethane triglycidyl ethers, dibromoneopentylglycol glycidyl ethers, propoxylated glycerol polyglycidyl ether, polypropylene glycol glycidyl ether, polyglycidyl ether of castor oil, dimer acid diglycidyl esters, resorcinol diglycidyl ether, epoxidized propylene glycol dioleates, epoxy esters, 1,2-tetradecane oxides, internally epoxidized 1,3-butadiene homopolymers, diglycidyl ether, glycidyl glycidate, bis(2,3-epoxy-2-methylpropyl)ether, polyglycoldiepoxides, E-caprolactone triol, copolymers of styrene, butyl rubber, neoprene, polysiloxanes, carboxyl terminated poly n-butylacrylates, maleic anhydride terminated rubbers, epoxy functionalized rubbers, fluoridized rubbers, and hydroxylated or carboxylated EPDM rubbers. See specification, page 16, line 28 - page 19, line 7.

The composition may include a catalyst material selected from the group consisting of imidazoles, tertiary amines, benzyldimethylamine, 1,3-tetramethyl butane diamine, tris (dimethylaminomethyl) phenol, pyridine, triethylendiamine, aluminum chloride, boron trifluoride, ferric chloride, titanium chloride, zinc chloride, sodium acetate, disodium cyanide, sodium cyanate, potassium thiocyanate, sodium bicarbonate, sodium boronate, and cobalt, manganese, iron, zinc, or copper acetylacetonate, octoate, or naphthenates. See specification, page 22, lines 1-17.

The flexibilizer may comprises a thermoplastic material containing a thermoplastic oligomer backbone. See specification, page 17, lines 28-31.

The present invention discloses a method of making an encapsulant composition. The method comprises providing a first quantity of resin material. The method further comprises adding to said first quantity of resin material a second quantity of flexibilizing agent by homogenizing said flexibilizing agent in said first quantity of resin material by reacting said resin material and said flexibilizing agent together at a temperature of greater than about 100 degrees Celsius. See specification, page 25, lines 17-29. The method further comprises adding to said first quantity of resin material a second quantity of flexibilizing agent by adding to said first quantity of resin material a third quantity of filler material comprising substantially spherical or spheroidal particles, each particle having a diameter of less than about 41 microns. Each particle may have a diameter exceeding 31 microns. The method further comprises adding to said first quantity of resin material a second quantity of flexibilizing agent by blending said resin material. blending is performed under vacuum. See specification, page 21, lines 10-12. After said blending said flexibilizing agent may comprise 2 percent to about 5 percent by weight of said composition. See specification, page 15, line 25 - page 16, line 2.

The flexibilizer may comprises a thermoplastic material containing a thermoplastic oligomer backbone. See specification, page 17, lines 28-31.

## ISSUES

1. Whether claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50 are unpatentable under 35

U.S.C. §103(a) over Christie et al. (5,668,059).

2. Whether claims 1, 5, 6, 8, 44, and 48 are unpatentable under 35 U.S.C. §103(a) over Day et al. (6,444,407B1).

3. Whether claims 1, 5, 8, 14, 18-23, 25, 26, 28, 31, 37, 39, 41, 44, and 46-50 are anticipated under 35 U.S.C. §102(e) by Shiobara et al. (6,376,100).

4. Whether claims 23 and 43 are unpatentable under 35 U.S.C. §103(a) over Shiobara et al. (6,376,100) in view of Christie et al. (5,668,059).

5. Whether claim 27 is unpatentable under 35 U.S.C. §103(a) over Shiobara et al. (6,376,100) in view of Potter (Epoxide Resins).

## **GROUPING OF CLAIMS**

The claims are grouped as shown in Table 1, wherein groups are defined for each issue stated *supra*. The groups associated with different issues do not stand or fall together, because the different issues are distinguished by the statutory basis and prior art reference(s) used to reject the claims.



Table 1

Group	Issue	Claims	Do Claims of Group Stand or Fall Together?
1	1	1, 5, 6, 14, 18-29, 37, 39	Yes
2	1	31	Yes
3	1	41, 43	Yes
4	1	48-50	Yes
5	2	1, 5, 6, 8, 44, 48	Yes
6	3	1, 18-22, 25, 39, 41, 44, 46-50	Yes
7	3	5, 28	Yes
8	3	8, 31	Yes
9	3	26	Yes
10	3	14, 37	Yes
11	3	23	Yes
12	4	23	Yes
13	4	43	Yes
14	5	27	Yes

Issue 1

The claims of Group 2 do not stand or fall together with the claims of Group 1, because the claims of Group 2 relate to the following sub-issue not relevant to the claims of Group 1: whether Christie teaches or suggests any of the flexibilizing agents listed in claim 31.

The claims of Group 3 do not stand or fall together with the claims of Groups 1-2, because the claims of Group 3 are drawn to a method, whereas the claims of groups 1-2 are not drawn to a method.

The claims of Group 4 do not stand or fall together with the claims of Groups 1-3, because the claims of Group 4 relate to the following sub-issue not relevant to the claims of Groups 1-3: whether Christie teaches or suggests “wherein each [filler] particle has a diameter exceeding 31 microns”.

#### Issue 2

The claims for of Group 5 stand or fall together.

#### Issue 3

The claims of Group 7 do not stand or fall together with the claims of Groups 6, because the claims of Group 7 relate to the following sub-issue not relevant to the claims of Groups 6: whether Shiobara teaches “wherein said resin material is an epoxy resin and comprises glycidyl ethers”.

The claims of Group 8 do not stand or fall together with the claims of Groups 6-7, because the claims of Group 8 relate to the following sub-issue not relevant to the claims of Groups 6-7: whether Shiobara teaches “wherein said flexibilizing agent is selected from the group consisting of polysulfones, polyetherimide, polyamideimides, polyarylene ethers, polyesters, polyarylates, polycarbonates, polyurethanes, hydroxy-terminated polysulfone oligomers, 1,4-butane-diol diglycidyl ethers, neopentylglycol diglycidyl ether, cyclohexane dimethanol diglycidyl ether, trimethylol ethane triglycidyl ethers, dibromoneopentylglycol glycidyl ethers, propoxylated glycerol polyglycidyl ether, polypropylene glycol glycidyl ether, polyglycidyl ether of castor oil, dimer acid diglycidyl esters, resorcinol diglycidyl ether,

epoxidized propylene glycol dioleates, epoxy esters, 1,2-tetradecane oxides, internally epoxidized 1,3-butadiene homopolymers, diglycidyl ether, glycidyl glycidate, bis(2,3-epoxy-2-methylpropyl)ether, polyglycoldiepoxydes, E-caprolactone triol, copolymers of butadiene and styrene, butyl rubber, neoprene, polysiloxanes, carboxyl terminated poly n-butylacrylates, maleic anhydride terminated rubbers, epoxy functionalized rubbers, fluoridized rubbers, and hydroxylated or carboxylated EPDM rubbers”.

The claims of Group 9 do not stand or fall together with the claims of Groups 6-8, because the claims of Group 9 relate to the following sub-issue not relevant to the claims of Groups 6-8: whether Shiobara teaches “wherein said resin material is an epoxy resin and comprises cycloaliphatic epoxides”.

The claims of Group 10 do not stand or fall together with the claims of Groups 6-9, because the claims of Group 10 relate to the following sub-issue not relevant to the claims of Groups 6-9: whether Shiobara teaches “wherein a portion of each of said spherical or spheroidal particles includes a layer of coupling agent positioned thereon”.

The claims of Group 11 do not stand or fall together with the claims of Groups 6-10, because the claims of Group 11 relate to the following sub-issue not relevant to the claims of Groups 6-10: whether Shiobara teaches “wherein said substrate further includes a layer of glass material therein”.

#### Issue 4

The claims of Group 13 do not stand or fall together with the claims of Groups 12, because the claims of Group 13 relate to the following sub-issue not relevant to the claims of

Groups 6: whether Shiobara teaches “wherein said step of blending is performed under vacuum”.

Issue 5

The claims for of Group 14 stand or fall together.

## ARGUMENT

### Issue 1

### CLAIMS 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, AND 48-50 ARE NOT UNPATENTABLE UNDER 35 U.S.C. §103(a) OVER CHRISTIE ET AL. (5,668,059).

The Examiner rejected claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50 as allegedly being unpatentable under 35 U.S.C. §103(a) over Christie et al. (5,668,059).

### Claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50

Appellant respectfully contends that claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50 are not unpatentable over Christie, because Christie does not teach or suggest each and every feature of claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50. For example, Christie does not teach or suggest “a flexibilizing agent comprising 2 percent to about 5 percent by weight of said composition”.

Appellant notes that the Examiner has alleged that Christie teaches that the flexibilizing agent comprises a maximum of about 1.6 percent by weight of said composition, and the Examiner alleges that “two is close enough to the 1.6% bw of Christie to have the same effect on the composition.” In response, Appellant contends that since the claimed 2 percent differs from Christie’s upper limit of 1.6 percent by 25% which is indeed a very large percentage deviation, the preceding argument by the Examiner is based on nothing more than guesswork and speculation, since the Examiner has not provided any support as to why “two is close enough to the 1.6% bw of Christie ...”.

In addition, the Examiner has not supplied any argument as to why a person of ordinary

skill in the art would modify Christie's maximum disclosed 1.6 weight percent of flexibilizing agent. By not providing appropriate argumentation and support, the Examiner has failed to establish a *prima facie* case of obviousness, as explained next.

Established case law requires that the prior art must contain some suggestion or incentive that would have motivated a person of ordinary skill in the art to modify a reference or to combine references. See *Karsten Mfg. Corp. V. Cleveland Gulf Co.*, 242 F.3d 1376, 58 U.S.P.Q.2d 1286, 1293 (Fed. Cir. 2001 ("In holding an invention obvious in view of a combination of references, there must be some suggestion, motivation, or teaching in the prior art that would have led a person of ordinary skill in the art to select the references and combine them in a way that would produce the claimed invention.")). See also *In re Gordon*, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984 ("The mere fact that the prior art could be so modified would not have made the motivation obvious unless the prior art suggested the desirability of the modification.")). Appellant maintains that the Examiner has not made any showing of where the prior art suggests a suggest a flexibilizing agent comprising 2 percent by weight of the composition. By not citing any suggestion or incentive in the prior art for a flexibilizing agent comprising 2 percent by weight of the composition, the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50.

Moreover, the prior art reference must teach or suggest all limitations in the claims. See *In re Wilson*, 424 F.2d 1382, 1385, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970) ("All words in a claim must be considered in judging the patentability of the claim against the prior art"). By not citing any reference that teaches or suggests the claim feature of 2 percent by weight of flexibilizer, the Examiner has failed to establish a *prima facie* case of obviousness in relation to

claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50.

In addition, Appellant will next demonstrate that such a 2.0 weight percent of flexibilizing agent would violate fundamental concepts of Christie's invention as explained next.

On page 3 of a previous office action mailed 11/08/2002, the Examiner presents a calculation showing that the maximum weight percent of the flexibilizing agent in the composition is 1.6%, based on Christie's disclosure that the maximum weight percent of the epoxy binder in the composition is 80% and the maximum weight percent of the flexibilizing agent in the epoxy binder is 2% (i.e.,  $80\% \times 2\% = 1.6\%$ ). Therefore, in order for the maximum weight percent of the flexibilizing agent in the composition to be as high as 2%, then either the maximum weight percent of the epoxy binder in the composition must sufficiently exceed 80% or the maximum weight percent of the flexibilizing agent in the epoxy binder must sufficiently exceed 2%, or both. However, the maximum weight percent of the epoxy binder in the composition cannot exceed 80%, because to do so would force the filler weight composition to be less than 20%, and Christie requires the filler to have a minimum weight percent of 20% in the composition (see Christie, col. 10, lines 10-14).

Therefore, in order for the maximum weight percent of the flexibilizing agent in the composition to be as high as 2%, the weight percent of the flexibilizing agent in the epoxy binder would have to be 2.5% (i.e.,  $80\% \times 2.5\% = 2\%$ ). However, Christie utilizes the flexibilizing agent in the epoxy binder to impart desirable mechanical properties to the composition such as flexibility and thermal shock resistance, and Christie identifies this utility of the flexibilizing agent with a range of 0.7% to 2% weight percent in the epoxy binder (see Christie, col. 11, lines 14-24). Since Christie specifically discloses that 0.7% to 2% is the

disclosed range of weight percent to achieve the preceding benefit of the flexibilizing agent, a person of ordinary skill in the art would have no reason to modify Christies invention to use 2.5% as the weight percent. Appellant notes that 2.5% is not only outside of the disclosed 0.7% to 2% range, but is 20% higher than the upper end of 2% of the disclosed 0.7% to 2% range, which represents a major percentage deviation from the flexibilizer range disclosed by Christie for the purpose of imparting desirable mechanical properties to the composition.

In addition, Appellant contends that Christie does not teach or suggest “filler material comprising substantially spherical or spheroidal particles”. The Examiner argues: “It is the examiner's position that the particles of Christie et al. are substantially spheroidal or spherical, as applicant has not defined substantially, and therefore the term substantially has been treated on the merits according to the MPEP, section 2173.05(b). Further, they are the same filler as applicant's.”

In response, Appellant contend that Christie does not teach or suggest that the filler material comprises substantially spherical or spheroidal particles, irrespective of the meaning of “substantially”, and the Examiner has not provided a citation in Christie that has any bearing on this issue. The only argument offered by the Examiner is that Christie discloses “the same filler as applicant's.” Such an argument is an argument of inherency, and an argument of inherency cannot be used, as a matter of law, to support a rejection under 35 U.S.C. §103(a). Moreover, Appellant's specification discloses on page 23, lines 10-12, that “[t]he filler particles **can** have substantially spherical or spheroidal shapes” (emphasis added). Note that the specification says “can” and does not say “does”, which overcomes the Examiner's argument of inherency even if



an argument of inherency is permitted 35 U.S.C. §103(a). Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50.

Based on the preceding arguments, Appellant respectfully maintains that claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50 are not unpatentable over Christie, and that claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50 are in condition for allowance.

#### Claim 31

Appellant contends that Christie does not disclose any flexibilizing agent listed in claim 31. The Examiner argues: “Regarding claim 31, Christie et al. disclose a flexibilizing agent selected from the group as instantly claimed (col.11, lines 14-33).”

In response, Appellant contends that col.11, lines 14-33 of Christie does not disclose any flexibilizing agent listed in claim 31. Indeed, the Examiner has not specifically identified in col.11, lines 14-33 of Christie any flexibilizing agent listed in claim 31. Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claim 31.

#### Claims 41 and 43

The Examiner admits: “Regarding claim 41, Christie et al. do not appear to specifically disclose the instantly claimed method steps.” The Examiner argues: “However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have added

the flexibilizer to the resin at an elevated temperature in a separate step because the flexibilizer acts to make the resin composition more resilient, and if not mixed with the resin and melted into the composition, then it does not have the desired flexibilizing effect on the composition.”.

In response, Appellant notes that the Examiner has not provided any prior art reference to support what the Examiner alleges to be obvious to one of ordinary skill in the art at the time the invention was made. In order to prove obvious, the Examiner must find the suggestion of obviousness in the prior art as explained *supra*, which the Examiner has not done. Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 41 and 43.

#### Claims 48-50

Appellant respectfully contends that claims 48-50 are not unpatentable over Christie, because Christie does not teach or suggest “wherein each particle has a diameter exceeding 31 microns”. In particular, Christie requires that “[t]he particle size of the filler **must** not be greater than 31 microns ...” (emphasis added). The preceding “**must**” language in Christie has the legal effect of delineating a precise sharply-defined upper limit of 31 microns to the particle size of the filler. Because of said strong language in Christie, Appellant contends that it is not obvious for the particle size of the filler to exceed 31 microns by *any* finite amount, no matter how small. Since claims 48-50 require the particle size of the filler to exceed 31 microns, Appellant respectfully contends that claims 48-50 are not obvious over Christie.

Appellant acknowledges that the Examiner has presented an argument as to why it would allegedly be obvious for the particle size of the filler to exceed the disclosed upper limiting value

of 31 microns in Christie. Appellant notes that the Examiner's argument is based on the idea that a value reasonably close to 31 microns has the same effect on the composition as does a value of exactly 31 microns. However, the Examiner has not taken into account the aforementioned sharply-defined cutoff of 31 microns in the Christie disclosure. Appellant respectfully maintains that a person of ordinary skill in the art would not consider it obvious to go above 31 microns, even by a very small amount, due the fact that Christie clearly teaches that the particle size of the filler **must** not exceed 31 microns. In other words, a filler particle size exceeding 31 microns is greater than the maximum filler particle size of 31 microns that is unconditionally and unambiguously **required** by Christie.

Based on the preceding arguments, Appellant respectfully maintains that claims 48-50 are not unpatentable over Christie, and that claims 48-50 are in condition for allowance.

## **Issue 2**

### **CLAIMS 1, 5, 6, 8, 44, AND 48 ARE NOT UNPATENTABLE UNDER 35 U.S.C. §103(a) OVER DAY ET AL. (6,444,407B1).**

The Examiner rejected claims 1, 5, 6, 8, 44, and 48 as allegedly being unpatentable under 35 U.S.C. §103(a) over Day et al. (6,444,407B1).

Appellant respectfully contends that claims 1, 5, 6, 8, 44, and 48 are not unpatentable over Day, because Day does not teach or suggest each and every feature of claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50. For example, Day does not teach or suggest "filler material comprising substantially spherical or spheroidal particles". The Examiner alleges that Day discloses "a substantially spheroidal or spherical filler (col.6, lines 35-39)". In response, Appellant contends that col.6, lines 35-39 of Day discloses a filler but does not disclose that the

filler comprises substantially spherical or spheroidal particles as alleged by the Examiner and as required by claims 1, 5, 6, 8, 44, and 48. Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 1, 5, 6, 8, 44, and 48.

In addition, Applicant contends that Day cannot be used as prior art in rejecting claims of the present patent application, because “[e]ffective November 29, 1999, subject matter which was prior art under former 35 U.S.C. 103 via 35 U.S.C. 102(e) is now disqualified as prior art against the claimed invention if that subject matter and the claimed invention ‘were, at the time the invention was made, owned by the same person or subject to assignment by the same person.’” MPEP 706.02(1)(1). First, the present patent application was filed on February 7, 2001 which is after November 29, 1999. Second, the Day patent is being considered by the Examiner as prior art under former 35 U.S.C. 103 via 35 U.S.C. 102(e), because the Day patent issued on September 3, 2002 which is after the filing date of February 7, 2001 of the present patent application. Third, both the subject matter of Day patent and the claimed invention of the present patent application were, at the time the invention was made, owned by International Business Machines Corporation or subject to assignment by International Business Machines Corporation. Accordingly, Applicant respectfully maintains that Day cannot be used as a prior art reference.

Based on the preceding arguments, Appellant respectfully maintains that claims 1, 5, 6, 8, 44, and 48 are not unpatentable over Day, and that claims 1, 5, 6, 8, 44, and 48 are in condition for allowance.

**Issue 3**

**CLAIMS 1, 5, 8, 14, 18-23, 25, 26, 28, 31, 37, 39, 41, 44, AND 46-50 ARE NOT ANTICIPATED UNDER 35 U.S.C. §102(e) BY SHIOBARA ET AL. (6,376,100).**

The Examiner rejected claims 1, 5, 8, 14, 18-23, 25, 26, 28, 31, 37, 39, 41, 44, and 46-50 under 35 U.S.C. §102(e) as allegedly being anticipated by Shiobara et al. (6,376,100 B1).

**Claims 1, 18, and 41**

Appellant respectfully contends that claims 1, 18, and 41 are not anticipated by Shiobara, because Shiobara does not teach each and every feature of claims 1, 18, and 41. For example, Shiobara does not teach the following feature of claims 1, 18, and 41: “An encapsulant composition comprising ... a flexibilizing agent comprising 2 percent to about 5 percent by weight of said composition ” (claim1) and similar language for claims 18 and 41.

The Examiner argues that Shiobara teaches an encapsulant composition comprising “a flexibilizing agent selected from the group as instantly claimed (col.9, line 12-col.12, line 61), comprising 2 to 15 parts by weight of the composition (col.12, lines 57-61)”.

The Examiner has not specifically identified the flexibilizing agent (hereinafter, “flexibilizer”) allegedly disclosed in Shiobara, col.9, line 12-col.12, line 61, which places Appellant in the position of having to make a judgment as to which material in Shiobara, col.9, line 12-col.12, line 61 is alleged by the Examiner to be a flexibilizer. By not having identified an alleged flexibilizer in Shiobara, col.9, line 12-col.12, line 61, the rejection of claims 1, 18, and 41 is improper, and Appellant accordingly maintains that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 1, 18, and 41.

Nonetheless, Appellant notes the following recitation in Shiobara, col.9, lines 12-20: “In

the underfill material of the invention, silicone rubber, silicone oil, liquid polybutadiene rubber or a thermoplastic resin such as methyl methacrylate-butadienestyrene **copolymer** may be blended for the purpose of stress reduction. The preferred stress reducing agent is a **copolymer** obtained through addition reaction between an epoxy or phenolic resin having alkenyl groups and an organohydrogenpolysiloxane ... ” (emphasis added). Based on the preceding recitation in Shiobara, Appellant hereby concludes that the aforementioned “copolymer” is constructively alleged by the Examiner to be the flexibilizer of claims 1, 18, and 41.

Appellant contends that there is no disclosure in Shiobara that Shiobara’s copolymer comprises 2 percent to about 5 percent by weight of the composition as required by claim 1. The Examiner argues that Shiobara, col.12, lines 57-61 discloses that the flexibilizer comprises 2 to 15 parts by weight of the composition, which is an invalid argument. Specifically, Shiobara, col.12, lines 57-61 recites: “The copolymer is blended in such amounts that 0 to 20 parts, and preferably 2 to 15 parts by weight of the diorganopolysiloxane units may be available per 100 parts by weight of the epoxy resin (A) whereby the stress can be further reduced. ” However, the diorganopolysiloxane is not Shiobara’s polymer that is comprised by the encapsulent composition, but rather is starting material from which the copolymer is generated via a chemical reaction. See Shiobara, col. 9, lines 16-20 (“The preferred stress reducing agent is a copolymer obtained through addition reaction between an epoxy or phenolic resin having --alkenyl groups and an **organohydrogenpolysiloxane** ... “) (emphasis added). Thus, the 2 to 15 parts by weight of the diorganopolysiloxane units per 100 parts by weight of the epoxy resin is not a weight percent of the copolymer in the composition. Indeed, there is no disclosure in Shiobara of the percent weight composition of the copolymer in the composition. Accordingly, Appellant

contends that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 1, 18, and 41.

Appellant further argues that Shiobara's copolymer is not the flexibilizer of claims 1, 18, and 41. The meaning of "flexibilizing agent" in claims 1, 18, and 41 is provided in the present patent application of Appellant. See Appellant's specification, page 15, line 25 - page 16, line 5 ("The compositions of this invention utilize a flexibilizer which comprises about 1.0% to about 5% by weight of the composition. The purpose of the flexibilizer is to impart desirable mechanical properties to the cured composition, such as flexibility and thermal shock resistance especially when such compositions can experience temperature excursions below -40 °C."). See also Appellant's specification, page 18, lines 19-23 ("In addition to increasing the fracture toughness of the cured resin, the addition of low viscosity flexibilizers can also significantly reduce the overall viscosity of the uncured resin/flexibilizer mixture. ").

In contrast, the only characterization of Shiobara's copolymer by Shiobara is that the copolymer is for the purpose of "stress reduction" (see Shiobara, col.9, lines 12-16). However, Shiobara does not disclose the nature of the stress that is being reduced by the copolymer. Therefore, Appellants contend that there is insufficient disclosure in Shiobara to infer that Shiobara's copolymer is the flexilizer of claims 1, 18, and 41. Moreover, the Examiner has not provided any argument to support an allegation that Shiobara's copolymer is the flexilizer of claims 1, 18, and 41. Indeed, the Examiner has not even alleged that Shiobara's copolymer is the flexibilizer of claims 1, 18, and 41 as explained *supra*.

Based on the preceding arguments, Appellant contends that claims 1, 18, and 41 are not

anticipated by Shiobara.

#### Claims 5 and 28

Since claims 5 and 28 respectively depend from claims 1 and 18, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claims 5 and 28 are likewise not anticipated by Shiobara under 35 U.S.C. §102(e).

In addition, Appellant contends that Shiobara does not disclose the following feature of claims 5 and 28: “wherein said resin material is an epoxy resin and comprises glycidyl ethers”.

The Examiner alleges that Shiobara, col. 2, line 44 - col. 3, line 19 discloses said feature of claims 5 and 28.

In response, Appellant contends that Shiobara, col. 2, line 44 - col. 3, line 19 does not disclose said glycidyl ethers as required by claims 5 and 28. Accordingly, Appellant contends that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 5 and 28.

#### Claims 8 and 31

Since claims 8 and 31 respectively depend from claims 1 and 18, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claims 8 and 31 are likewise not anticipated by Shiobara under 35 U.S.C. §102(e).

In addition, Appellant contends that Shiobara does not disclose the following feature of



claims 8 and 31: “wherein said flexibilizing agent is selected from the group consisting of polysulfones, polyetherimide, polyamideimides, polyarylene ethers, polyesters, polyarylates, polycarbonates, polyurethanes, hydroxy-terminated polysulfone oligomers, 1,4-butane-diol diglycidyl ethers, neopentylglycol diglycidyl ether, cyclohexane dimethanol diglycidyl ether, trimethylol ethane triglycidyl ethers, dibromoneopentylglycol glycidyl ethers, propoxylated glycerol polyglycidyl ether, polypropylene glycol glycidyl ether, polyglycidyl ether of castor oil, dimer acid diglycidyl esters, resorcinol diglycidyl ether, epoxidized propylene glycol dioleates, epoxy esters, 1,2-tetradecane oxides, internally epoxidized 1,3-butadiene homopolymers, diglycidyl ether, glycidyl glycidate, bis(2,3-epoxy-2-methylpropyl)ether, polyglycoldiepoxides, E-caprolactone triol, copolymers of butadiene and styrene, butyl rubber, neoprene, polysiloxanes, carboxyl terminated poly n-butylacrylates, maleic anhydride terminated rubbers, epoxy functionalized rubbers, fluoridized rubbers, and hydroxylated or carboxylated EPDM rubbers”.

The Examiner alleges that Shiobara, col. 9, line 12 - col. 12, line 61 discloses said feature of claims 8 and 31.

In response, Appellant contends that Shiobara, col. 9, line 12 - col. 12, line 61 does not disclose said feature of claims 8 and 31. The only copolymers which alleged by the Examiner to be flexibilizers are found in Shiobara, col. 9, lines 13-15, namely: “silicone rubber, silicone oil, liquid polybutadiene rubber or a thermoplastic resin such as methyl methacrylate-butadienestyrene copolymer”, none of which are recited in claim 8. Accordingly, Appellant contends that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 8 and 31.

#### Claim 25

Since claim 25 depends from claim 18, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claim 25 is likewise not anticipated by Shiobara under 35 U.S.C. §102(e).

#### Claim 26

Since claim 26 depends from claim 18, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claim 26 is likewise not anticipated by Shiobara under 35 U.S.C. §102(e).

In addition, Appellant contends that Shiobara does not disclose the following feature of claim 26: “wherein said resin material is an epoxy resin and comprises cycloaliphatic epoxides”.

Moreover, the Examiner’s rejection of claim 26 is improper, because the Examiner has not provided any citation in Shiobara disclosing that the resin material comprises cycloaliphatic epoxides.

#### Claims 14 and 37

Since claims 14 and 37 respectively depend from claims 1 and 18, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claims 14 and 37 are likewise not anticipated by Shiobara under 35 U.S.C. §102(e).

In addition, Appellant contends that Shiobara does not disclose the following feature of

claims 14 and 37: “wherein a portion of each of said spherical or spheroidal particles includes a layer of coupling agent positioned thereon”.

The Examiner alleges that Shiobara, col. 3, lines 44-52 disclose said feature of claims 14 and 37.

In response, Appellant contends that Shiobara, col. 3, lines 44-52 does not disclose said feature of claims 8 and 31. In fact, Shiobara, col. 3, lines 44-52 does not even mention said spherical or spheroidal particles.

#### Claims 19-22

Since claims 19-22 depend from claim 18, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claims 19-22 are likewise not anticipated by Shiobara under 35 U.S.C. §102(e).

#### Claim 23

Since claim 23 depends from claim 18, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claim 23 is likewise not anticipated by Shiobara under 35 U.S.C. §102(e).

In addition, Appellant contends that Shiobara does not disclose the following feature of claim 23: “wherein said substrate comprises a ceramic material”, as admitted by the Examiner on page 4 in the office action mailed 07/13/2004 (“Regarding claim 23, Shiobara et al. do not appear to specifically disclose the ceramic substrate as claimed.”).

### Claim 39

Since claim 39 depends from claim 18, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claim 39 is likewise not anticipated by Shiobara under 35 U.S.C. §102(e).

### Claims 44, 46, and 47

Since claims 44, 46, and 47 respectively depend from claims 1, 18, and 41, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claims 44, 46, and 47 are likewise not anticipated by Shiobara under 35 U.S.C. §102(e).

### Claims 48, 49, and 50

Since claims 48, 49, and 50 respectively depend from claims 1, 18, and 41, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claims 48, 49, and 50 are likewise not anticipated by Shiobara under 35 U.S.C. §102(e).

#### Issue 4

#### CLAIMS 23 AND 43 ARE NOT UNPATENTABLE UNDER 35 U.S.C. §103(a) OVER SHIOBARA ET AL. (6,376,100) IN VIEW OF CHRISTIE ET AL. (5,668,059).

The Examiner rejected claims 23 and 43 under 35 U.S.C. §103(a) as allegedly being unpatentable over Shiobara et al. (6,376,100 B1) in view of Christie et al. (5,668,059).

#### Claim 23

Since claim 23 depends from claim 18, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claim 23 is not unpatentable over Shiobara in view of Christie under 35 U.S.C. §103(a).

In addition, Appellant contends that Shiobara does not disclose the following feature of claim 23: “wherein said substrate comprises a ceramic material”.

The Examiner admits: “Regarding claim 23, Shiobara et al. do not appear to specifically disclose the ceramic substrate as claimed.” The Examiner alleges that Christie discloses a ceramic substrate and that “it would have been obvious to one of ordinary skill in the art at the time the invention was made for Shiobara et al. to have used a different substrate, such as a ceramic substrate as that taught by Christie et al., because Christie et al. teach that using a ceramic substrate produces improved flow characteristics resulting in a higher quality product.”.

In response, Appellant contends that the preceding argument of the Examiner for modifying Shiobara by the alleged teaching of Christie is not persuasive, because Christie does not disclose that the ceramic substrate improves flow characteristics. Rather, Christie, col. 9, lines 49-53 teaches that the “[t]he particle size of the filler must not be greater than 31 microns or

less, preferably about 0.7 to about 31 microns, and most preferably about 0.5 to about 20 microns. This is necessary so that the composition will readily flow in the gap between the chip and substrate carrier.” In other words, Christie teaches that the improved flow characteristics of the composition are due to the particle size of the filler and not due to the ceramic substrate.

Accordingly, Appellant contends that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claim 23.

#### Claim 43

Since claim 43 depends from claim 41, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claim 43 is not unpatentable over Shiobara in view of Christie under 35 U.S.C. §103(a).

In addition, Appellant contends that Shiobara does not disclose the following feature of claim 43: “wherein said step of blending is performed under vacuum”.

The Examiner admits: “Regarding claim 43, Shiobara et al. do not appear to specifically disclose homogenizing the materials under vacuum.” The Examiner alleges that Christie discloses homogenizing the materials under vacuum and that “it would have been obvious to one of ordinary skill in the art at the time the invention was made for Shiobara et al. to have performed the homogenizing under vacuum as taught by Christie et al. to the composition of Shiobara et al. because Christie et al. teach that homogenizing under vacuum improves the rate of the volatilization of solvents, producing a more efficient process.”

In response, Appellant maintains that Christie does not teach that homogenizing under

vacuum improves the rate of the volatilization of solvents, producing a more efficient process as alleged by the Examiner. Indeed, the Examiner has not provided any citation in Christie disclosing that homogenizing under vacuum improves the rate of the volatilization of solvents, producing a more efficient process.

Accordingly, Appellant contends that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claim 43.

**Issue 5**

**CLAIM 27 IS NOT UNPATENTABLE UNDER 35 U.S.C. §103(a) OVER SHIOBARA ET AL. (6,376,100) IN VIEW OF POTTER (EPOXIDE RESINS).**

The Examiner rejected claim 27 under 35 U.S.C. §103(a) as allegedly being unpatentable over Shiobara et al. (6,376,100 B1) in view of Potter (Epoxy Resins)

Since claim 27 depends from claim 18, which Appellants have argued *supra* to not be anticipated by Shiobara under 35 U.S.C. §102(e), Appellant maintain that claim 27 is not unpatentable over Shiobara in view of Christie under 35 U.S.C. §103(a).

In addition, Appellant contends that Shiobara does not disclose the following first feature of claim 27: “ wherein said resin material is an epoxy resin and comprises cycloaliphatic epoxides”.

The Examiner alleges that “Shiobara et al. disclose a cycloaliphatic epoxide of the cyclopentadiene type (col.2, line 54).”

In response, Appellant cites Shiobara, col.2, line 54 as teaching “cyclopentadiene type

epoxy resins” which is not a teaching of “cycloaliphatic epoxides” as required by claim 27.

Accordingly, Appellant contends that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claim 27.

Furthermore, Appellant contends that Shiobara does not disclose the following second feature of claim 27: ““wherein said cycloaliphatic epoxides are derived from unsaturated aromatic hydrocarbon compounds”.

The Examiner argues: “Shiobara et al. disclose a cycloaliphatic epoxide of the cyclopentadiene type (col.2, line 54). Shiobara et al. do not appear to disclose the derivation thereof. Potter discloses a typical process for forming cycloaliphatic epoxide resins by using cyclopentadiene (page 135, bottom of the page). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the cyclopentadiene type epoxide of Shiobara et al. to have been produced by the method of Potter because Potter teaches that cyclopentadiene type epoxide resins can be made according to this process”.

In response, Appellant contends that the preceding argument by the Examiner is not persuasive, because the Examiner has incorrectly cited Potter inasmuch as Potter does not illustrate or discuss cyclopentadiene on page 135 of Potter.

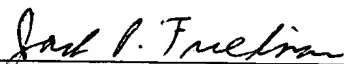
Accordingly, Appellant contends that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claim 27.



## SUMMARY

In summary, Appellant respectfully requests reversal of the rejection of claims 1, 5, 6, 8, 14, 18-29, 31, 37, 39, 41, 43, 44, and 46-50.

Respectfully submitted,

  
\_\_\_\_\_  
Jack P. Friedman  
Attorney For Appellant  
Registration No. 44,688

Dated: 10/07/2004

Schmeiser, Olsen & Watts  
3 Lear Jet Lane - Suite 201  
Latham, New York 12110  
(518) 220-1850



Docket No.: END920000065US1

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Appellant: Papathomas, Konstantinos

Examiner: Keehan, Christopher M.

Serial No.: 09/778,996

Art Unit: 1712

Filing Date: 2/7/01

Title: **ENCAPSULANT COMPOSITION AND ELECTRONIC PACKAGE UTILIZING SAME**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**APPENDIX - CLAIMS ON APPEAL**

1. An encapsulant composition comprising:

a resin material selected from the group consisting of epoxy and cyanate ester resins;

a flexibilizing agent comprising 2 percent to about 5 percent by weight of said composition; and

a filler material comprising substantially spherical or spheroidal particles, each particle having a diameter of less than about 41 microns.

5. The composition of claim 1 wherein said resin material is an epoxy resin and comprises glycidyl ethers.

6. The composition of claim 1 wherein said resin material is a cyanate ester resin and comprises

at least a di-cyanate ester resin.

8. The composition of claim 1 wherein said flexibilizing agent is selected from the group consisting of polysulfones, polyetherimide, polyamideimides, polyarylene ethers, polyesters, polyarylates, polycarbonates, polyurethanes, hydroxy-terminated polysulfone oligomers, 1,4-butane-diol diglycidyl ethers, neopentylglycol diglycidyl ether, cyclohexane dimethanol diglycidyl ether, trimethylol ethane triglycidyl ethers, dibromoneopentylglycol glycidyl ethers, propoxylated glycerol polyglycidyl ether, polypropylene glycol glycidyl ether, polyglycidyl ether of castor oil, dimer acid diglycidyl esters, resorcinol diglycidyl ether, epoxidized propylene glycol dioleates, epoxy esters, 1,2-tetradecane oxides, internally epoxidized 1,3-butadiene homopolymers, diglycidyl ether, glycidyl glycidate, bis(2,3-epoxy-2-methylpropyl)ether, polyglycoldiepoxydes, E-caprolactone triol, copolymers of butadiene and styrene, butyl rubber, neoprene, polysiloxanes, carboxyl terminated poly n-butylacrylates, maleic anhydride terminated rubbers, epoxy functionalized rubbers, fluoridized rubbers, and hydroxylated or carboxylated EPDM rubbers.

14. The composition of claim 1 wherein a portion of each of said spherical or spheroidal particles includes a layer of coupling agent positioned thereon.

18. An electronic package comprising:

a substrate having an upper surface;

a semiconductor chip mounted on a portion of said upper surface of said substrate and

electrically coupled to said substrate, said semiconductor chip having a bottom surface and at least one edge surface being substantially perpendicular to said bottom surface; and

a material positioned on at least said portion of said upper surface of said substrate and against at least a portion of said at least one edge surface of said semiconductor chip, said material being an encapsulant composition which includes a resin material, a flexibilizing agent comprising 2 percent to about 5 percent by weight of said composition, and a filler material comprising substantially spherical or spheroidal particles, each particle having a diameter of less than about 41 microns.

19. The electronic package of claim 18 wherein said substrate comprises an organic material.

20. The electronic package of claim 19 wherein said organic material includes a resin selected from the group consisting of epoxies, polyimides, cyanates, fluoropolymers, benzocyclobutenes, polyphenylenesulfides, polysulfones, polyetherimides, polyetherketones, polyphenylquinoxalines, polybenzoxalines, polybenzoxazoles, polyphenylbenzobisthiazoles, dicyclopentadienes, and halide free resins .

21. The electronic package of claim 19 wherein said substrate further includes a reinforcing material.

22. The electronic package of claim 21 wherein said reinforcing material is selected from the group consisting of organic woven fibers, organic non-woven fibers, inorganic woven fibers, and

inorganic non-woven fibers.

23. The electronic package of claim 18 wherein said substrate comprises a ceramic material.
24. The electronic package of claim 23 wherein said substrate further includes a layer of glass material therein.
25. The electronic package of claim 18 wherein said resin material is selected from the group consisting of epoxy and cyanate ester resins.
26. The electronic package of claim 25 wherein said resin material is an epoxy resin and comprises cycloaliphatic epoxides.
27. The electronic package of claim 26 wherein said cycloaliphatic epoxides are derived from unsaturated aromatic hydrocarbon compounds.
28. The electronic package of claim 25 wherein said resin material is an epoxy resin and comprises glycidyl ethers.
29. The electronic package of claim 25 wherein said resin material is a cyanate ester resin and comprises at least a di-cyanate ester resin.

31. The electronic package of claim 18 wherein said flexibilizing agent is selected from the group consisting of polysulfones, polyetherimide, polyamideimides, polyarylene ethers, polyesters, polyarylates, polycarbonates, polyurethanes, hydroxy-terminated polysulfone oligomers, 1,4-butane-diol diglycidyl ethers, neopentylglycol diglycidyl ether, cyclohexane dimethanol diglycidyl ether, trimethylol ethane triglycidyl ethers, dibromoneopentylglycol glycidyl ethers, propoxylated glycerol polyglycidyl ether, polypropylene glycol glycidyl ether, polyglycidyl ether of castor oil, dimer acid diglycidyl esters, resorcinol diglycidyl ether, epoxidized propylene glycol dioleates, epoxy esters, 1,2-tetradecane oxides, internally epoxidized 1,3-butadiene homopolymers, diglycidyl ether, glycidyl glycidate, bis(2,3-epoxy-2-methylpropyl)ether, polyglycoldiepoxydes, E-caprolactone triol, copolymers of styrene, butyl rubber, neoprene, polysiloxanes, carboxyl terminated poly n-butylacrylates, maleic anhydride terminated rubbers, epoxy functionalized rubbers, fluoridized rubbers, and hydroxylated or carboxylated EPDM rubbers.

37. The electronic package of claim 18 wherein a portion of each of said spherical or spheroidal particles includes a layer of coupling agent positioned thereon.

39. The electronic package of claim 18 wherein said composition further includes a catalyst material selected from the group consisting of imidazoles, tertiary amines, benzyldimethylamine, 1,3-tetramethyl butane diamine, tris (dimethylaminomethyl) phenol, pyridine, triethylendiamine, aluminum chloride, boron trifluoride, ferric chloride, titanium chloride, zinc chloride, sodium acetate, disodium cyanide, sodium cyanate, potassium

thiocyanate, sodium bicarbonate, sodium boronate, and cobalt, manganese, iron, zinc, or copper acetylacetonate, octoate, or naphthenates.

41. A method of making an encapsulant composition, the method comprising the steps of:

providing a first quantity of resin material;

adding to said first quantity of resin material a second quantity of flexibilizing agent by homogenizing said flexibilizing agent in said first quantity of resin material by reacting said resin material and said flexibilizing agent together at a temperature of greater than about 100 degrees Celsius;

adding to said first quantity of resin material a third quantity of filler material comprising substantially spherical or spheroidal particles, each particle having a diameter of less than about 41 microns; and

blending said resin material, wherein after said blending said flexibilizing agent comprises 2 percent to about 5 percent by weight of said composition.

43. The method of making the composition of claim 41 wherein said step of blending is performed under vacuum.

44. The composition of claim 1, wherein said flexibilizer comprises a thermoplastic material containing a thermoplastic oligomer backbone.

46. The electronic package of claim 18 wherein said flexibilizer comprises a thermoplastic material containing a thermoplastic oligomer backbone.
47. The method of claim 41 wherein said flexibilizer comprises a thermoplastic material containing a thermoplastic oligomer backbone.
48. The composition of claim 1 wherein each particle has a diameter exceeding 31 microns.
49. The electronic package of claim 18 wherein each particle has a diameter exceeding 31 microns.
50. The method of claim 41 wherein each particle has a diameter exceeding 31 microns.